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$$(\frac{1}{2}b\cos A - \frac{1}{2}d) : \frac{b-d}{2} = \frac{b+d}{2} : x.$$

Construction. Draw AC equal to b , draw the indefinite line AW , making an angle at A equal to the given angle. On AW lay off AD equal to $\frac{1}{2}b$, and draw DE perpendicular to AC . From E lay off EI equal to $-\frac{1}{2}d$. Then will AI equal $\frac{1}{2}b\cos A - \frac{1}{2}d$.

On AW lay off AH equal to $\frac{b-d}{2}$ and draw HI . On AC lay off AM equal to $\frac{b+d}{2}$, and through M draw a line parallel to HI meeting AW at B . Join BC . Then will ABC be the triangle required.

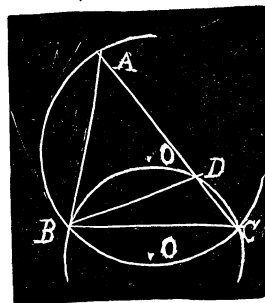
Similarly solved by G. B. M. Zerr.

II. Solution by J. SCHEFFER, A. M., Hagerstown, Md.

On the given base, BC , as a chord, describe a circle O , containing the segment whose angle contains the angle $= 90^\circ + \frac{1}{2}A$, A being the given vertical angle, and also a circle O' , the segment of which contains the angle A . Make BD = given difference of sides; extend BD to A , where it cuts the circumference of circle O' . Draw AC ; then ABC is the required triangle.

For, $\angle ADC = 90^\circ - \frac{1}{2}A$.

$\therefore \angle ACD = 90^\circ - \frac{1}{2}A$; $\therefore AD = AC$; $\therefore AB - AC = BD$ = given difference, which proves construction.



Solved similarly C. N. Schmall and H. C. Feemster.

357. Proposed by E. R. HOYT, St. Louis, Mo.

A room is 30 feet long, 12 feet wide, and 12 feet high. At one end of the room, 3 feet from the floor, and midway from the sides, is a spider. At the other end, 9 feet from the floor, and midway from the sides, is a fly. Determine the shortest path by way of the floor, ends, sides, and ceiling, the spider can take to capture the fly.

Solution by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

Suppose the six sides of the room spread out in one plane as in the figure, the floor being the second rectangle from the bottom, and let x = distance of spider from floor, $12 - x$ the distance of the fly, $x < 6$. There are three courses for the spider to take.

First, the route $SC = 30 + x + 12 - x = 42$ feet... (1).

Second, the route $SB = \sqrt{[(Sb)^2 + (Bb)^2]} = \sqrt{[(36+x)^2 + (18-x)^2]} \dots$ (2).

Third, the route $SA = \sqrt{[(Sa)^2 + (Aa)^2]} = \sqrt{[(30+2x)^2 + (24)^2]} \dots$ (3).

Let $(30+2x)^2 + 576 = (36+x)^2 + (18-x)^2$.